Sea star catch data and chlorophyll a collected during benthic dredge operations on board the R/V Clifford A. Barnes cruise CB1038 from Jan 5 to 10th in 2016 between Seattle and Bellingham, WA (Sea Star Microbiology project)

Website: https://www.bco-dmo.org/dataset/716316
Data Type: Cruise Results
Version:
Version Date: 2017-10-05

Project
» Microbial ecology of sea star wasting disease (Sea Star Microbiology)

Contributors	Affiliation	Role
Hewson, Ian	Cornell University (Cornell)	Principal Investigator, Contact
York, Amber D.	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Table of Contents

Coverage

Spatial Extent: **N**:48.7208 **E**:-122.3236 **S**:47.575 **W**:-123.1

Dataset Description

This dataset includes sea star catch data by species collected during benthic dredge operations on board the R/V Clifford Barnes cruise CB1038, 5 – 10 January 2016 between Seattle and Bellingham, WA. Chlorophyll a concentrations are also included.

The purpose of this survey was to determine the distribution of Sea Star Wasting Disease (SSWD) in sea star populations inhabiting the 30 – 50m depth range at locations around the Salish Sea in Winter 2015-2016.

Methods & Sampling

Methodology:

A survey of SSWD was performed in Salish Sea waters 30 – 50m to determine the presence of Sea Star Wasting Disease (SSWD). Asteroids were frozen for later determination of viral prevalence and load of the sea star associated densovirus (SSaDV). Chlorophyll a concentrations as measured by acetone extracted fluorometry.

Sampling and analytical procedures:

Benthic dredge operations were performed on board the R/V Clifford A. Barnes during a 5-day cruise from

Seattle to Bellingham, encompassing the range of the early (2013-2014) range of SSWD. Dredge operations comprised a 10-minute dredge following the 30 – 50m contour (determined using depth sounder). Dredge materials were emptied on deck, rinsed with flow-through seawater, and then quantified by species of sea star and presence or absence of SSWD. In addition, sympatric echinoderms (holothurians and echinoids) were also quantified. At each station, samples for chlorophyll a (2L surface seawater), virioplankton composition (20L), and sediments (5ml via Van Veen grab) were also taken. In addition, a 5-minute plankton tow (202um 1m net) was performed. After retrieval, asteroids were photographed to document overall size, and if >5 cm arm diameter dissected into constituent tissues (pyloric caeca, gonad, coelomic fluid and body wall). Animals that were < 5cm were frozen as whole animals.

Chlorophyll a was determined using acetone-extracted fluorometry. Seawater (1L) was filtered over a 25mm diameter GF/A filter, which was then folded and placed into light-impermeable foil, and frozen prior to analysis. The filter was then extracted using 90% acetone (5ml) in 100x13mm borosilicate glass tubes overnight at -20oC. The extract was then quantified using a Turner Designs Aquafluor fluorometer.

Data Processing Description

CO-DMO Data Manager Processing Notes:
* added a conventional header with dataset name, PI name, version date
* modified parameter names to conform with BCO-DMO naming conventions
* param name edits [space -> _] [period -> deleted] [SE -> Chlorophyll_a_SE]
* made longitude decimal degrees negative
* added month and year of sampling
* species names edit to match the accepted species names using World Register of Marine Species (as of 2017-10-17). Names verified by data contributor. List of changes below.

Species names edited in dataset:
Solaster stimpsonii to accepted name Solaster stimpsoni 292729
Evasterias troscheli to accepted name Evasterias troschelii 255040
Orthasterias kohleri to accepted name Orthasterias koehleri 255048Hippasteria spinosa 254900 to accepted name Hippasteria phrygiana 124043

[table of contents | back to top]

Data Files

File
CAB.csv (Comma Separated Values (.csv), 2.20 KB) MD5:16431605c79457a769bebb7721cb0c52 Primary data file for dataset ID 716316

[table of contents | back to top]

Parameters

Parameter	Description	Units
Station	Station number	unitless
Name	Location name	unitless
Month	Month of sampling in format mm	unitless

Year	Year of sampling in format yyyy	unitless
Lat_Decimal_Degrees	Latitude	decimal degrees
Long_Decimal_Degrees	Longitude	decimal degrees
Chlorophyll_a	Chlorophyll a concentration (acetone extracted)	micrograms per liter (ug/L)
Chlorophyll_a_SE	Chlorophyll a standard error	micrograms per liter (ug/L)
Crossaster_papposus	Number of Crossaster papposus caught	individuals
Dermasterias_imbricata	Number of Dermasterias imbricata caught	individuals
Evasterias_troschelii	Number of Evasterias troschelii caught	individuals
Henricia_spp	Number of Henricia spp caught	individuals
Hippasteria_phrygiana	Number of Hippasteria phrygiana caught	individuals
Luidia_foliolata	Number of Luidia foliolata caught	individuals
Mediaster_aequalis	Number of Mediaster aequalis caught	individuals
Orthasterias_koehleri	Number of Orthasterias koehleri caught	individuals
Pisaster_brevispinus	Number of Pisaster brevispinus caught	individuals
Pteraster_tesselatus	Number of Pteraster tesselatus caught	individuals
Pycnopodia_helianthoides	Number of Pycnopodia helianthoides caught	individuals
Solaster_stimpsoni	Number of Solaster stimpsoni caught	individuals

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	Benthic dredge, Turner Designs Aquafluor
Generic Instrument Name	Benthic sampler
Generic Instrument Description	A mechanical device that collects organisms from the seafloor. Includes dredges, sledges, weighted nets like beam trawls, and ROV manipulators. A description of benthic samplers and links to further resources can be found at marinespecies.org: http://marinespecies.org/introduced/wiki/Sampling_tools_for_the_marine_e...

[table of contents | back to top]

Deployments

CB1038

Website	https://www.bco-dmo.org/deployment/716246
Platform	R/V Clifford A. Barnes
Start Date	2016-01-05
End Date	2016-01-10

[table of contents | back to top]

Project Information

Microbial ecology of sea star wasting disease (Sea Star Microbiology)

Website: http://seastarwastingdisease.wordpress.com

Coverage: Salish Sea and Alaskan Waters

Beginning in June 2013 and continuing to present (May 2015), over 20 species of sea stars (Asteroidea, Echinodermata) have been affected by sea star wasting disease (SSWD), affecting populations from central Alaska to Baja California. The disease has lead to greatly reduced abundance or disappearance of these keystone predators, which may result in profound alteration to benthic community structure. Recent work has identified the sea star associated densovirus (SSaDV) as the most likely causative agent of the disease. SSaDV is related to densoviruses inhabiting other echinoderms worldwide, and has been present in West Coast asteroid populations for at least 72 years. Hence, there remain significant knowledge gaps in our understanding of how SSaDV actually elicits SSWD symptoms, especially how the echinoderm host, densovirus and microbiome constituents interact. This project will address three major questions: 1) does viral infection change the composition of the sea star microbiome?, 2) what is the variation of viral genomes and their associated virulence?, and 3) does larval dispersal spread the disease between habitats? This project will address these hypotheses through time-course measurements of host, pathogen and associated microorganisms, genome-genome comparisons between historical and contemporary viral strains, and through experiments targeting larvae and juvenile asteroids in aquaria and in nature.

This project will address three fundamental questions relating to Sea Star Wasting Disease (SSWD): 1) How does SSaDV causes SSWD symptoms and how does the disease progress from primary infection through animal mortality; 2) How do current genotypes of SSaDV vary from those present historically, and is virulence related to genome polymorphisms; and 3) Are larvae and juvenile asteroids differentially affected by SSaDV, and are broadcast-spawned bipinarria a viable mechanism for SSaDV dispersal between distant habitats. The first question will be addressed by experimental inoculation of naïve sea stars with SSaDV, then time-course monitoring of host transcription (i.e. transcriptomics via RNAseq), microbiome composition via 16S rRNA

sequencing and quantitative PCR, and viral load and prevalence using quantitatice PCR. The second question will be addressed by amplifying the entire genome of SSaDV and related densoviruses, then perform genome-genome comparisons to identify polymorphic DNA in key protein-encoding regions. The third question will be addressed by collecting bipinarria from plankton at field locations adjacent to spawning asteroid populations, and by performing time-course observations of captive juvenile sea stars and monitoring their bacterial and viral loads using quantitative PCR. This work will be performed primarily in the Salish Sea region, with SSaDV - naïve asteroids collected from Alaskan waters.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1537111

[table of contents | back to top]